ABSTRACT

Mr. Hardeep Singh Mankoo, U.R.No.100376880546 of M.Tech.

Electronics & Communication Engg.

INVESTIGATIONS ON 16X16 MULTIPLE Tx/Rx AND 16-CHANNEL DWDM TECHNIQUES IN INTERSATELLITE OPTICAL WIRELESS COMMUNICATION SYSTEM USING IM/DD AND CO-QPSK SCHEMES

In order to increase the performance of optical communication system, the transmission capacity and link distance are the most crucial parameters that are needed to be improved. The intersatellite optical wireless communication (IsOWC) is used because higher data rates for longer distances can be achieved with minimum time delay. The analysis of 16x16 multiple Tx/Rx system and 16-channel DWDM system through IM/DD and CO-QPSK techniques are done and from simulations, it is observed that maximum achievable distance of IsOWC link is a function of bit rates. For the transmission of data at longer distances, data rates should be low. The results of simulation for comparison between the two techniques in ISOWC system model are presented and discussed. The system performance was analyzed and compared when bit rates and link distance of the system is varied and values of Q-factor and minimum BER are obtained. The comparison analysis of 16-channel DWDM system shows that the bit rate up to 90 Gbps can be obtained through QPSK DWDM technique at the distance of 18,000 kms with Q-factor of 6.18 and minimum BER is 2.23×10^{-9} and a distance of 40,000 km with bit rate of 10 Gbps with Q-factor of 5.02 and minimum BER is 3.53×10^{-9} whereas the IM/DD DWDM system bit rate is 10 Gbps at distance of 5,300 km with Q-factor of 5.94 and minimum BER is 1.39×10^{-9} and a

distance of 22,500 km is achieved at bit rate of 40 Mbps wit Q-factor of 5.89 and minimum BER is 1.84×10^{-9}. The comparison analysis of 16x16 Multiple Tx/Rx system shows that the bit rate up to 90 Gbps can be obtained through 16x16 Multiple Tx/Rx CO-QPSK technique at the distance of 15,000 kms with Q-factor of 6.42 and minimum BER is 0.13×10^{-9} and a distance of 35,000 km with bit rate of 10 Gbps with Q-factor of 5.57 and minimum BER is 5.63×10^{-9} whereas the 16x16 Multiple Tx/Rx IM/DD system bit rate is 90 Gbps at distance of 2,810 km with Q-factor of 5.70 and minimum BER is 5.67×10^{-9} and a distance of 22,500 km is achieved at bit rate of 30 Mbps with Q-factor of 5.67 and minimum BER is 7.10×10^{-9}. It is analyzed from the observations that CO-QPSK technique has better results as compared with IM/DD technique. It suggests a proposal to the use of 16-channel DWDM and 16x16 Multiple Tx/Rx architectures for improved IsOWC links. These systems provide longer distance and high data rates for intersatellite communication.